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Robertson, Wendy C., and Paul A. Soderdahl. 2004. Everything You Always Wanted to Know About SFX But Were Afraid to Ask. *Serials Librarian* 47 (1/2).

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# Everything You Always Wanted to Know About SFX But Were Afraid to Ask

Wendy C. Robertson and Paul A. Soderdahl

## Abstract

Link resolvers, including Ex Libris' SFX, use OpenURL to provide library patrons with context-sensitive links, such as the ability to move quickly from a citation in an abstracting and indexing database to the full text. In SFX, information for determining the appropriate links is maintained in the knowledge base, which contains details about a library's electronic holdings and other information about electronic information resources. This article describes SFX functionality, what the service looks like from a patron's point of view, and how it can be of particular assistance to a serials librarian.

Keywords: link resolver, SFX, OpenURL, context-sensitive linking

In their most common usage, link resolvers provide the ability for a library patron to move quickly from a citation in an abstracting and indexing database to the full text. Because the links are context-sensitive the patron will only see those links that the library has determined are appropriate, such as when full text is accessible to the local institution. Most link resolvers today, including Ex Libris' SFX, SIRSI's OpenURL Resolver, Endeavor's LinkFinder Plus, and 1Cate, rely on OpenURL architecture. SFX was not only built on the OpenURL framework, it was the technology for which OpenURL was originally defined and thus was the first OpenURL-based link resolver on the market. This article will provide an overview of SFX functionality and how it can be of particular assistance to a serials librarian.<sup>1</sup>

### Sources and Targets

Before explaining in further detail what SFX does, it will be useful to explain terminology used by the SFX product and how these terms will be used in this article. In SFX, the entire database is called the "knowledge base." Inside the knowledge base, libraries configure the "sources" and "targets" for these context-sensitive links.

"Sources" refer to the sources of the OpenURL – the places in which the SFX button appears. Sources must be OpenURL compliant in order to present the patron with a link to the institution's link resolver. When publishers first began adopting OpenURL, most sources were abstracting and indexing databases with an OpenURL for each bibliographic citation. As the standard becomes more prevalent, some publishers of full text (e.g., Institute of Physics) are now adding OpenURL links to each reference cited in the article's bibliography. Library online public access catalogs can also be sources.<sup>2</sup>

The destination links are called "targets." When a library patron clicks on an OpenURL, the bibliographic metadata is sent to the SFX link resolver which presents

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<sup>1</sup> As with any software, new features and improvements are always being added to SFX so it is quite possible that features that do not exist at the time of writing may well exist at time of publication.

<sup>2</sup> Over two dozen information providers have OpenURL databases configured to work in SFX. See <http://www.sfxit.com/sources-list.html>. The University of Iowa's SFX implementation, locally known as InfoLink, is currently configured to work with more than 80 databases as sources. See <http://gateway.lib.uiowa.edu/gwsearch.asp?search=infoLink>.

the patron with a list of possible targets appropriate for that metadata. Targets may be commercial publishers (e.g., Elsevier's ScienceDirect), society publishers (e.g., American Chemical Society), collections (e.g., BioOne), full text databases (e.g., EBSCOhost's Academic Search Elite), service providers (e.g., Ingenta), online publishers (e.g., Highwire Press), independent journals (e.g., D-Lib), library catalogs (e.g., Library of Congress), document delivery services (e.g., CISTI), or general interest web sites (e.g., Google). Almost anything can be a target. The knowledge base included with SFX is pre-configured for hundreds of targets and libraries can easily add their own.<sup>3</sup> Targets do not need to be OpenURL compliant. Any web resource can be made into a target as long as there is a way to link into it.

Web resources that have some syntax for deep linking are the most effective targets. Some full-text publishers provide only a mechanism to link to the journal title level. Others may allow linking to the volume or issue level. Most have some way to link directly to the article level, either with a persistent URL or through the use of a digital object identifier (DOI). SFX uses the bibliographic metadata in the OpenURL to form the deep link. If the metadata includes volume, issue, and starting page, SFX can usually generate a deep link directly to the article. If there are fewer metadata elements (e.g., only ISSN and year), then the patron may be taken only to the journal title level, even if the target supports deep linking. In other words, the ability to go directly from citation to full text depends both on the metadata from the source in the OpenURL and the ability of the target to support deep linking.

The SFX knowledge base contains several hundred thousand brief records for journals, electronic books, preprints, and newspapers, with just enough bibliographic data to find the item given various metadata elements (such as abbreviated title or ISSN/ISBN). Each record may be linked to one or more targets, depending on the number of information providers that provide access to a given title.<sup>4</sup> For example, the record for the *Serials Librarian* shows that it is available in full text from Haworth Press and SwetsWise, with tables of contents and/or abstracts found in several other databases.

For each information provider, the knowledge base contains details about the electronic holdings, which may include a starting date, an ending date, or information about a moving wall for availability of full text (e.g., "more than five years ago"). These electronic holdings can display to the public as an "availability" statement.

### **The User Interface**

The most straightforward application of SFX is to link from an abstracting and indexing database to a full-text article, typically from another information provider. Figure 1 shows a bibliographic citation from EBSCOhost's Academic Search Elite with an InfoLink icon. (InfoLink is the University of Iowa's local name for its SFX service.) When the library patron clicks on InfoLink, EBSCOhost passes the metadata for that

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<sup>3</sup> See <http://www.sfxit.com/targets.html>.

<sup>4</sup> This is how SFX can be used to solve the "appropriate copy" problem. While many licensed databases include their own embedded citation reference linking, they typically assume a one-to-one relationship between source and target. In reality, multiple copies of electronic journal articles often exist, and the most appropriate copy often depends on the location or affiliation of the library user.

bibliographic citation in the OpenURL, which is sent to the SFX server. Figure 2 shows a list of services appropriate for that metadata.

**Title:** Fur Traders in Conversation.

**Author(s):** [Murray, Laura J.](#)

**Source:** [Ethnohistory](#); Spring2003, Vol. 50 Issue 2, p285, 30p

**Document Type:** Article

**Subject(s):** [HARMON, Daniel](#)  
[FUR trade](#)  
[ETHNOHISTORY](#)

**Abstract:** Firsthand accounts of fur trade life often express frustration at the lack of conversation in fur trade country. By conversation, partners, clerks, and bourgeois had in mind a particular mode of talk associated with a particular cultural world; they often did not acknowledge the presence of other modes of talk around them. This article pursues the example of Daniel Harmon, a Vermonter who served with the North West Company (NWC) from 1800 to 1819, arguing that attention to Harmon's expectations about conversation can permit us to use him more effectively as an ethnographic source both for his home cultural formation and for the Native and Canadian cultures within which he worked, lived, and married. [ABSTRACT FROM AUTHOR]

**ISSN:** 00141801

**Accession Number:** 10116605

**Persistent Link to this Article:** <http://search.epnet.com/direct.asp?an=10116605&db=afh>

**Database:** Academic Search Elite

**View Links:** [InfoLink](#)

**Figure 1. Sample bibliographic citation from EBSCOhost's Academic Search Elite.**

InfoLink

**Title** Fur Traders in Conversation.  
**Source** Ethnohistory [0014-1801] Murray  
yr: 2003 vol: 50 iss: 2 pg: 285

- [Full text available via Project Muse](#) Availability: from 1999 volume 46 issue 4  
year:  volume:  issue:  start page:
- [Check the University of Iowa's library catalog for this item](#)
- [View this journal's Impact Factor Trend Graph in JCR SocSci](#)
- [Click here to Ask a librarian for help](#)
- [Go to Frequently Asked Questions \(FAQ\)](#)
- [What you should know about using electronic information resources](#)  
Plagiarism, copyright, fair use, and terms of licenses

**Figure 2. Sample SFX list of services.**

In this example, a link to the full text is available through Project Muse. Even though this journal title is also available from JSTOR and Academic Search Elite, they do not appear as targets because the article was published in 2003, which is too recent for both moving walls. Other targets include a link to the record for this journal title in the library's catalog and in ISI Journal Citation Reports, as well as static links to the library's ask-a-librarian service, frequently asked questions page, and plagiarism and copyright document.

When a given article is available from more than one information provider, libraries can configure their SFX service to show targets in a given order or to show only preferred targets, such as those with unlimited simultaneous users, those which allow direct linking to the article, or those which library staff recommend for ease-of-use.

Other targets can be displayed conditionally as well. In this example, ISI Journal Citation Reports is configured in the SFX knowledge base to display only for journal titles tracked in that database. The link to the library catalog is displayed only if a record is found in the catalog.<sup>5</sup>

SFX can also be used to generate an alphabetical list of e-journals, with an availability statement for each full-text target. Figure 3 shows an example with two different targets.



Figure 3. Sample item from alphabetical list of e-journals.

When the patron clicks on the journal title, an SFX menu appears with input fields for year, volume, issue, and starting page. Figure 4 shows the SFX menu for *Ethnohistory*.

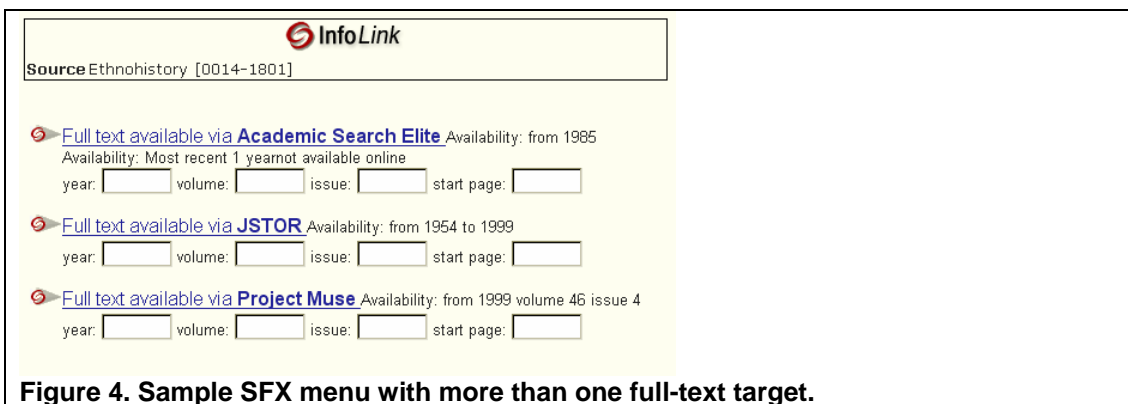


Figure 4. Sample SFX menu with more than one full-text target.

If the patron leaves these fields blank, SFX will link to the journal title level. If enough citation information is provided, SFX will link directly to the article.

The library catalog can also be configured as an SFX source. Figure 5 shows a record from the University of Iowa with an InfoLink icon in this brief record display.

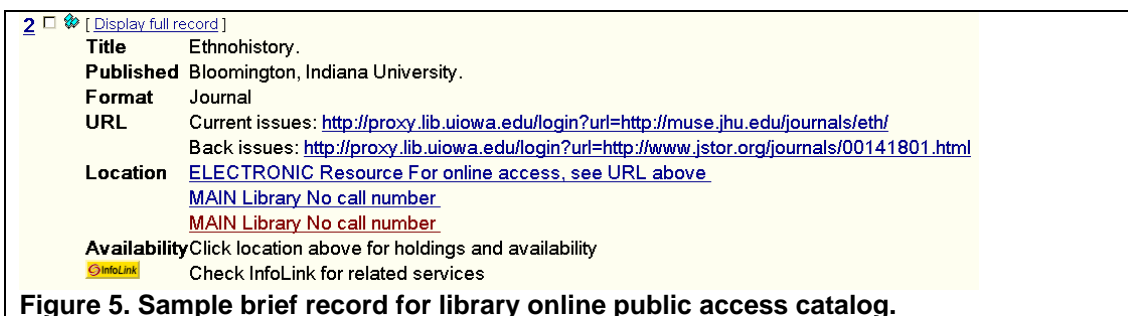


Figure 5. Sample brief record for library online public access catalog.

<sup>5</sup> SFX can use an API (application programming interface) or the Z39.50 protocol to see if a record is in the catalog before displaying this option to the user.

The catalog interface was configured to include a link to SFX for all records that have a URL (in 856 subfield u) and on all journal records (where the 008 position 21, type of serial, is coded "p").

### **Maintaining the Knowledge Base**

Configuring and maintaining the SFX knowledge base is fairly straightforward. When activating a single additional title in a target, it is easy to search for the title or ISSN, find the appropriate target, and click the activation icon. This point-and-click method, however, is usually not used for activating multiple titles, especially in large targets.

For licenses that include access to all available content (such as aggregator databases), all the titles can be activated at once. In addition, the SFX knowledge base is updated monthly by Ex Libris, and the target can be configured so that all additional titles added in future knowledge base updates are automatically activated. The web-based administrative interface also allows for batch processes to activate or deactivate titles.

At the University of Iowa, technology support staff are responsible for maintaining the SFX server and applying the monthly knowledge base updates, but serials staff assume responsibility for maintaining the content within the knowledge base. They are experts in interpreting the complexities in serials coverage. In general, the library is able to accept the default e-holdings data provided by Ex Libris. If the entire run of a title is not available because of a local licensing arrangement, serials staff can add local information to the configuration using a form to easily create the correct syntax. With the SFX link appearing in the local catalog, patrons can easily view summary e-holdings information directly from the SFX knowledge base.

SFX is designed as a link resolver, but it can also serve somewhat as a serials management tool. Although it lacks some desirable features for this use, it makes sense to rely on SFX as much as possible to minimize duplicating record maintenance. SFX targets often are the same as the licensing agency. This does not necessarily hold, however, for service providers or with publishers of online content. If the service provider differentiates among publishers in their URLs, such as in Ingenta Select, specific publishers can be identified within a target. From a serials management perspective, there is no way within SFX to differentiate resources licensed directly by the institution from those resources that are part of consortial arrangements. In a similar way, the targets are not tied to orders. Because there are relatively few targets at this time, however, it is possible to track target information adequately in acquisition orders.

The ability to set targets for automatically updating and activating everything is extremely useful for volatile aggregator databases. However, it is also very useful for collections that gradually have new titles added, such as Project Muse. The monthly updates include notification of changes, which identify what needs to be changed or updated. These reports can serve as an alert to a major change at a publisher's site, such as Springer's introduction of SpringerLink, or to highlight the availability of additional backfiles.

The information in the knowledge base may contain an occasional error. In these cases, library staff report the correction to Ex Libris and can make the correction locally.

When the next monthly knowledge base update comes out, this correction will be in the file so that all libraries can benefit from this shared maintenance.

There are a number of reports and batch processes that streamline maintenance of SFX data. A text file of ISSNs can be used to activate or deactivate objects or to change e-holdings information. Libraries can export all, active or only inactive titles within a target, which is very useful for comparison with a publisher's website. These results can also be compared to determine overlap between different products, helping in collection assessment.

### **New Enhancements**

With the release of version 2 in January 2003, Ex Libris added a number of tools in support of consortial implementations of SFX, including a gateway to allow multiple SFX servers to communicate with each other and present a single set of targets to the patron, regardless of whether access is provided through the institutional or consortial SFX server. In addition, the knowledge base and the application itself were made fully Unicode compliant, providing support for multiple languages and character sets.<sup>6</sup>

Ex Libris is planning to offer an optional MARC enhancement service, which provides libraries with full MARC records for loading their e-holdings into the local catalog. Rather than embedding a static URL for all locally relevant targets within the bibliographic record, the library's SFX server can then be used as the link resolver without duplicating data and providing a way for patrons to link from the catalog directly to the article level.

### **Support for Standards**

Ex Libris has demonstrated a commitment to open standards with SFX. As mentioned earlier, SFX was the technology for which OpenURL was defined. The current NISO standard, OpenURL 0.1, has been widely adopted by information providers and is used in a variety of link resolvers. The committee, whose membership includes Oren Beit-Arie of Ex Libris,<sup>7</sup> is now close to final approval for OpenURL 1.0. Ex Libris has announced that it will support the standard when it is approved.

OpenURL 1.0, officially known as Z39.88-2004, provides support for additional context that can be used in determining which services can be provided by the link resolver. At present, an OpenURL has three components – the base-url (identifying which link resolver to use), the sid (the source identifier indicating the information provider that created the OpenURL), and the bibliographic metadata of the object itself. In the emerging OpenURL 1.0 standard, the base-url becomes the "resolver," the sid becomes the "referrer," and the bibliographic metadata describing the object becomes the "referent." In addition, OpenURL 1.0 provides support for information about the "requester" (user), the "referring entity" (the object containing the item being referenced – for example, if the referent is a citation found in another full-text article, the referring

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<sup>6</sup> See Ex Libris press release dated January 24, 2003, at [http://www.sfxit.com/news/press\\_initial.html](http://www.sfxit.com/news/press_initial.html).

<sup>7</sup> See the NISO Committee AX site at <http://library.caltech.edu/openurl/default.htm> and the list of members at <http://library.caltech.edu/openurl/Membership.htm>.

entity may be the parent article containing that citation), and the requested service type.<sup>8</sup>

Another emerging development is the Shibboleth project, an Internet2/MACE (Middleware Architecture Committee for Education) initiative to develop an open, standards-based solution for exchanging information about users in a secure environment that preserves the user's privacy.<sup>9</sup> Shibboleth provides a mechanism for libraries to share user attributes with information service providers for the purpose of authentication and authorization. It holds the potential of replacing IP-based authorization and eliminating the need for library proxy servers.<sup>10</sup> An effective link resolver, therefore, must support Shibboleth so that it can broker the transaction between source and target. A "Shibbolized" link resolver can also offer context-sensitive services based on these user attributes. Along with information providers such as JSTOR and EBSCO and course management software companies such as WebCT and Blackboard, Ex Libris has begun to incorporate Shibboleth technology into SFX.<sup>11</sup>

### **Concluding Comments**

To date, Ex Libris itself is not a content provider. This strategy positions SFX developers to work equally well with all content providers, and the product does not favor any particular information provider over another.

Customers of SFX and MetaLib (Ex Libris' federated search and library portal software) have formed the SFX/MetaLib Users Group (SMUG), an active, independent users group that provides an opportunity for resource sharing among SFX and MetaLib implementers. Members of SMUG have been instrumental in working with information providers on their OpenURL implementations, benefiting the entire link server user community.

Many libraries that have implemented link resolvers, including the University of Iowa, have found that the service has become invaluable to its students and faculty. Link resolvers such as SFX provide libraries with a rare opportunity to leverage their access to web-based resources while maintaining local control over how the materials are presented and which links are most relevant to their patrons, a promising new element in any integrated library system.

### **Author Information**

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<sup>8</sup> National Information Standards Organization, *The OpenURL Framework for Context-Sensitive Services* (Bethesda, Md.: NISO, 2003), 19-20. This information is from the draft standard dated October 16, 2003, found at <http://library.caltech.edu/openurl/PubComDocs/StdDocs/Part1-PC-20031016.pdf>.

<sup>9</sup> See an introduction to Shibboleth at <http://shibboleth.internet2.edu/shib-intro.html>.

<sup>10</sup> See sample uses of Shibboleth at <http://shibboleth.internet2.edu/shib-uses.html>.

<sup>11</sup> See the announcement dated July 1, 2003, entitled "Shibboleth 1.0 Software Now Available" found at <http://www.nmi-edit.org>.